The Business Case for Green Materials

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Topics

Business Case for Green Materials
• Materials Restrictions in the Electronics Industry
• Costs of Complying with Materials Restrictions

Supply Chain Management for Green Materials
• Articulating Materials Goals
• Driving Development of Green Materials
• White Lists
Substance Restriction in the Electronics Industry

BACKGROUND
The Law That Changed the Electronics Industry

RoHS

EU Directive 2002/95/EC on the Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment

Logo from companion regulation Waste Electrical and Electronic Equipment (WEEE) Directive
Material Restrictions for Electronics

• Major class of product regulation

• Specific substances disallowed in products and packaging

• Material content reporting

56 Countries have material restriction laws for electronics products or packaging
COSTS OF COMPLYING WITH MATERIALS RESTRICTIONS
Replacing Materials is Expensive

- Direct material cost for replacement
  - Easy to track
- Transition costs
  - Distributed
  - Hard to track and measure
- Ongoing compliance costs
Examples of Transition Costs

- R&D for replacements
- Supplier communications
- Analytical testing
- New part numbers
- Component qualifications
- Manufacturing process adjustments
- Product redesign
- Product qualifications
- New regulatory certifications
Business Environment

• Increasing regulations
  – More substances restricted
  – More reporting requirements
  – More supplier responsibility for product content and recycling
  – Lack of harmonization between countries/regions

• World-wide customer trend to more interest in chemicals and exposure
Adapting to the New Environment

- Create systems to minimize the impact of increasing regulation
  - Lower transition costs for restricted materials
  - Maintain market access more efficiently (compliance)

- Anticipate regulation
  - Choose better replacement materials to avoid multiple substitutions
Example: Anticipating Regulation

- DEHP = plasticizer
- Widely used in electronics
- Potential restrictions
  - RoHS
  - REACH
  - TSCA
  - More
Different Material Selection Options

If Restricted

DEHP

Any unrestricted replacement
Phthalate 1 (Benchmark 1)

Incrementally better replacements
Phthalate 2 (Benchmark 2)

Better replacements
Non-phthalate (Benchmark 4)
Avoiding Extra Substitutions Saves Money

**Any unrestricted**
- Phthalate 1: $X
- Phthalate 2: $X
- Non-phthalate: $X

**Transition Costs**
- $3X

**DEHP**
- Incrementally better
  - Phthalate 2: $X
  - Non-phthalate: $X

- Best
  - Non-phthalate: $X

**$2X**

*Phthalates 1 and 2 and non-phthalate cost more than DEHP, but the cost differences between them is modest*
Avoid Multiple Substitutions

• When selecting replacements for restricted substances, screen alternatives to avoid substances that might be restricted in the future

• May need to go higher in management chain to reach right decision-maker for support
  - Beyond procurement
SUPPLY CHAIN MANAGEMENT FOR GREEN MATERIALS
Replacement Material Selection Criteria

Material Cost

Transition costs
Ongoing compliance costs
Procurement is Very Good with Numbers

$1

$2
You get a raise!

$1

$2
Not as Good with Environmental Criteria
Environmental Technical Specs

• Procurement has experience with technical specifications

• We can help them make decisions by integrating results of alternatives assessment into existing business processes for material selection
Green Screen Alternatives Assessment

• Green Screen is the primary tool HP uses for alternatives assessment when replacing a restricted substance
  – Aligns with regulators

• Enables identification of better materials, not just minimum acceptable

More information available at http://www.cleanproduction.org
Simple 1-4 score (1=bad, 4=good)

- Expert knowledge needed to generate score
- Simple score can be used by non-experts
- Add Risk Assessment, LCA, Carbon Footprint, as needed
Helps Procurement Make Decisions

Benchmark 4
$1

Benchmark 2
$1
You get a raise!

Benchmark 4

Benchmark 2
Making Sure Procurement Has Options to Choose

DRIVING DEVELOPMENT OF GREEN MATERIALS
Articulating Materials Goals

• If we don’t articulate environmental requirements to suppliers, we won’t get better materials
Electronics Supply Chain is Complicated

- Relatively small number of formulators
- Large number of intermediate suppliers
- Small number of OEMs
Pushing a Rope

• Trying to push requirements up through the supply chain doesn’t always work

• All feedback transmitted to formulators becomes “lower cost”
Engaging with Formulators

- Large companies can engage directly with formulators
- Give a range of feedback, in addition to cost
- Successfully used with other materials criteria (not just environment)
Influencing What’s on the Menu

• Introducing Green Screen to formulators
• Encouraging design of green materials from the beginning
  – Reduces cost adders
• Effective approach for larger companies
Creating Demand for Green Materials in the Supply Chain

WHITE LISTS
Reduce Cost Adder for Green Materials

Benchmark 4
$1.50 → $1
Increase Volume

Benchmark 2
$1
Create Pull for Green Materials

- Approved materials lists
  - Screening required for material approval
- White lists
  - Strongly favored by suppliers and procurement teams
  - Better if shared across industry (not company-specific)

<table>
<thead>
<tr>
<th>Green Screen Assessments of Similar Function Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
</tr>
<tr>
<td>Preferred</td>
</tr>
<tr>
<td>Design</td>
</tr>
<tr>
<td>Substance 0</td>
</tr>
<tr>
<td>Use but still opportunity for improvement</td>
</tr>
<tr>
<td>Substance 1</td>
</tr>
<tr>
<td>Substance 2</td>
</tr>
<tr>
<td>Use but search for alternatives</td>
</tr>
<tr>
<td>Substance 3</td>
</tr>
<tr>
<td>Substance 4</td>
</tr>
<tr>
<td>Substance 5</td>
</tr>
<tr>
<td>Substance 6</td>
</tr>
<tr>
<td>DO NOT USE</td>
</tr>
<tr>
<td>Substance 7</td>
</tr>
<tr>
<td>Substance 8</td>
</tr>
<tr>
<td>Substance 9</td>
</tr>
<tr>
<td>Substance 10</td>
</tr>
<tr>
<td>Substance 11</td>
</tr>
<tr>
<td>Substance 12</td>
</tr>
</tbody>
</table>
WRAP-UP
Green Materials and Business

- Avoid multiple substitutions by screening replacements for restricted substances
- Articulate environmental goals to suppliers and chemical formulators
- Incorporate environmental specs into existing procurement processes
- Support creation and use of industry-wide white lists
THANK YOU